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ABSTRACT

This conference paper highlights one infant education project as a successful example of a general, pervasive approach to stimulation in a group setting. The Ontario Institute and the Canadian Mothercraft Society have completed the first year of their 3-year day care demonstration project for advantaged and disadvantaged infants from 3 to 30 months of age. The program had been designed to facilitate infants' cognitive, personality, and social development through personalized adult-child interaction, guided learning situations, free play and specialized care. Infants in the program made significant gains over the first year in mental, social, and language development, especially for younger versus older infants compared with exclusively home-reared controls. Measures of caretaker and parent functioning also showed generally positive results. It is suggested that involvement, enthusiasm, and coordination of parent care and teaching activities were especially influential in the project's success. The importance of warm, sensitive relations with babies in both teaching and nonteaching situations is emphasized. The magnitude of gains for both advantaged and disadvantaged children suggests a range of potential greater than usually realized. See also PS 004 517 and ED 041 632. (WY)

A Developmental Learning Approach to Infant Care in a Group Setting

by

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A Developmental Learning Approach to Infant Care in A Group Setting[1]

Infancy is the most malleable, rapidly changing and least organized period of human development. Never again will there be the same potential for influencing the establishment of basic forms of understanding, style and feeling in all domains of experience. Early experience is the matrix from which all of later development is generated.

This is the concept which has governed the design of our program of total care and education for infants. All aspects of the child's relations with the physical and social environments in his life situation have been the subject of attention. The program follows a developmental learning approach: the methods of care and stimulation are developmentally adapted and sequenced to the processes and forms of understanding of the age period.

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The investigation is a joint effort between a research group of the Ontario Institute for Studies in Education and the teaching staff and student teachers of Canadian Mothercraft Society, designed by and based on program guides written by the principal investigator (Fowler, 1968 (a) & (b), 1969). The program, now in its third and terminal year, is set in the elaborate day care facilities (an old mansion) of Canadian Mothercraft in Toronto. There is accommodation for around thirty babies for all-day care; there are spacious and well-equipped playrooms (for both fine and gross perceptual-motor activities), sleeping, eating, washing and of course toileting facilities, kitchen and dining facilities for adults, infant diet kitchen, office space, library and meeting rooms, research laboratory and a very ample shaded playground.

Objectives

In the broadest sense, the two core objectives of the investigation have been: (1) to probe the significance of early experience as a period of foundation for learning, through (2) establishing a quality program of group day care and education for infants to serve as a model and resource to foster infant day care in Ontario and elsewhere in Canada. The program is aimed at two types of families in particular need of infant day care, working mothers and families in poverty. Both groups of families, for different reasons, are often confronted with conditions for rearing young children lacking in the psychological and socioeconomic resources necessary

for optimal development of infants. Integral to this comprehensive effort, is a host of research and development activities embracing infant program development (methods, materials and teacher guides), guidance and education programs for infants, students and parents, exploratory research projects on subsamples of children, and development of program-related measures.

In this paper I would like to summarize briefly the major features of the design, the families, the program and the evaluation in order to devote more attention to the dimensions of the program intended directly or indirectly to facilitate infant development. I will also discuss certain findings analyzed to date.

Research Design, Sampling and Program Overview

The general design for treatment and evaluation is comparatively simple, if not ideal, depending in some part upon the characteristics of the Mothercraft center and the limits of research resources. There is a regularly evolving group of 25 to 30 babies, of middle-class, working mothers, from 3 to 30 months old, assessed twice each year on a set of cognitive and socioemotional developmental measures. Replacing part of this basic population at any time are seven babies from economically disadvantaged families, the number determined by the capacity of the single microbus affordable to transport these children to the center. Middle-class babies are deposited and called for by their parents.

Except for age (under 6 months whenever feasible), sex and absence of organic and gross emotional disturbance, sampling criteria are determined by admissions policies aimed at service for working mothers according to order of application and need, with priority to single parent families. This pattern yields information on the developmental learning progressions of a slowly accumulating (over 3 years) sample pool of infants over periods from 5 to as long as 28 of their first 30 months. Attrition has been low: the mean length of stay (of children who have attained graduation age or dropped out) has been close to 15 months both for the advantaged and the disadvantaged. Criteria for disadvantaged infants are age (3 to 6 months), sex, parents with no more than tenth grade education and English speaking, and similar but more broadly interpreted emotional constraints and absence of organicity signs.

Control children were initially selected for the first year sample of 18 working mother infants and three disadvantaged children, until cost factors precluded further recruitment of controls. These exclusively home-reared controls were matched in pairs with the day care infants (who are of course partially home-reared) on the basis of age (within 2 months), sex, age placement scores of the Bayley Mental Scale (including Kohen-Raz (1967) subscale derivatives) and the Bayley Motor Scale, socioemotional

ratings, absence of gross differences in physical health, and both parents separated by no more than one year of schooling. Family characteristics like occupational level, number of siblings, parent age and marital status were considered as feasible. The omission of developmental IQ norms from the research version and the later slight modification of the Bayley Scales has unfortunately weakened the original matchings. Selected assessments of the original controls have continued until graduation of their day care sample mates.

The program has been developed in three spheres, all of which converge in their central purpose of enhancing infant development and learning. Most important is the management of influences operating directly on the infants; although secondary, the two additional spheres, education of Mothercraft student teachers and parent guidance, are both essential levers to maximize the range of influence exercised, but they also yield long-term benefits of their own. The infant program itself divides the child's day into three major categories of activity: (1) the developmental routines of physical care, which occupy the child inversely according to age, (2) an abundance of self-regulated free play in well stocked and arranged environments (indoors and out), (3) and guided learning of infants individually or in small groups in planned play activity. There are also neighbourhood walks and occasional excursions as a fourth activity. There is a set of general principles for cognitively and emotionally oriented stimulation and sensitive interpersonal care applied commonly to children in all of these situations, as well as specialized methods appropriate for each type of activity, to be outlined presently in detail. The principles are set

down in a number of conceptual papers (Fowler, 1965, 1967, 1970, 1971, in press (a) & (b); Fowler and Leithwood, in press), which have served as the basis for the program guides.

Student education consists of two parts, a broad course program and a training practicuum. There are courses in infant and child development, education and care, and mental health. Training in specific techniques and problems of infant care and education is imparted through tutorial demonstrations with infants, in small group discussions, and from guidance during actual caretaking and teaching routines.

Parent education and guidance has been implemented primarily through a single parent worker, trained in service in our methods and using a parent manual I have written for this purpose (Fowler, 1968). Working mothers typically must be visited in the evening or on weekends but are occasionally seen at lunch hour; communication is supplemented by telephone contact or the daily encounters with staff or students when the baby is delivered and called for. Visits have generally occurred three of four times per year (plus a few parent nights), depending upon need, but sometimes as often as several times a week with a few of our disadvantaged families. The latter are offered extensive practical information and guidance (coordinated with community agencies) to meet many chronic needs for coping in family and community living beyond the specific discussions on infant care and education furnished all parents. Demonstrations in the home on care and infant stimulation through play, occasional observations at the center, a circulating toy and book library for disadvantaged families, and combined social and instructional evenings have been central features of the parent program.

There are semi-annual infant developmental evaluations, using the Bayley Mental and Motor Scales and Behavior Profile and the Schaeffer and Aaronson Infant Behavior Inventory (unpublished). The Uzgiris and Hunt (1964) sensori-motor scales have also been employed, as well as selected measures of language, social adaptation, cognitive style, and other cognitive functions, usually related to focused developmental learning projects. Parents have been measured on the Schaeffer and Aaronson inventory of mothers' responses to education (unpublished). Each annual class of students has been assessed three times each year on a paragraph completion test of general concept level by Hunt (1967), which measures development of relativism, abstraction and generality in social rules and is reported to be associated with teaching competence. There are also self and teacher ratings on student development.

Dimensions of Infant Program

Domains and Developmental Organization of Experience

Following the conceptual framework developed by the principal investigator, there are certain characteristics of infant functioning conceptualized, which have led to the development of principles and methods with which the program is operated. Many of the ideas have of course been derived from Piaget, other areas of developmental theory, and learning, ability and personality theory, as well as empirical findings. The infant is viewed as a perceiving, thinking, acting and feeling creature whose developmental progress evolves through working out mental constructs of environmental relations and of the relation of his own actions (problem-solving strategies and skills) to environmental patternings. The emotions

are considered as his affective reactions to his success and failure and his pleasures and dissatisfactions with environmental object relations and their relations to him. The problem of development for the infant is one of moving from a relatively reflexive state, where little is known and single, semi-automatic responses to specific stimuli predominate, to a relatively organized and self-regulated state of competence around two to three years of age. At this point the infant has acquired relative physical mobility, a good foundation of language comprehension and many of the syntactical rules for language production, and a rudimentary set of generalizations about and cognitive strategies for coping and building in the physical and social world. He has a firm idea of the existence of objects, some knowledge of causality and of spatial and temporal relations generally. He can see himself as relatively autonomous and is able to interact concretely with both peers and adults.

Several dimensions of infant development appear particularly relevant to the design of infant developmental learning programs. First, cognitive development may be defined as the acquisition of systems of rule hierarchies and networks which can be defined and ordered logically as a basis for facilitating development of cognitive learning. There are general rules about how the world is structured (general dimensions and processes), rules for problem-solving strategies and creating, language system rules for generalized and abstract information processing, and rules for areas or types of knowledge, including information (or object) concepts of common categories like household objects, vehicles of transportation, archeology, plant forms, and so on. It is the acquisition and organization of mental

processes in terms of rule processes which enables the child to deal cognitively rather than associatively on a rote basis in his encounters with the world. Two, is that development proceeds from the simple to the complex, a step or two at a time, of which the developmental learning tasks for infants consist of laying foundation rules for the major systems of knowledge, language and problem-solving strategies. Third, the mechanisms of mental development consist of interweaving processes of analytic and integrative operations within the framework of the form and complexity of rule understanding the child has acquired. That is, mental actions alternate between ever more complex identification of stimulus elements and relations of rules (analytic processes) and mental constructing and reconstructing of environmental relations (integrative processes) into larger groupings of rules. In this way the child gradually acquires an increasingly differentiated but continually reorganized rule picture of the world. Fourth, the form in and rate at which experiences are developed make a difference as to the type and level of mental organization infants develop. In other words, the cumulative amount of the quality and types of developmental stimulation encountered will importantly affect the character and levels of development attained. Thus not only the presence or absence but the cumulative availability of models and guidance, over critical spans of development - within limits - determine, for example, the quality of language development or whether problem-solving strategies acquired become cognitive and flexible or rote and rigid.

These general propositions have determined a great deal of our approach to infant care and education. We use every opportunity of contact

with the babies as a means of facilitating his general and specific understanding and as a means of generating emotionally satisfying relations with people and things.

Emotional Sensitivity and Cognitive Stimulation in Methods of Physical Care

The approach may be clarified and principles illuminated by describing caretaker modes of handling babies in the typical developmental routines of physical care. The importance of cuddling and fondling infants in the feeding situation has been widely emphasized, without equivalent attention applied to the significance of the cognitive interactions which can occur. In every encounter, students are trained to be gentle, express warmth, fondle the baby, and be sensitive and flexible with respect to their needs. But great stress is also placed upon involving infants to the extent of their ability in the caretaking procedures themselves; this orientation is believed to facilitate the development of autonomy and environmental mastery and is one basis for the seeds of effective problem-solving strategies. For instance, self-feeding is encouraged as early as possible, first through familiarity then guiding the child in handling the tools. Thus, in the earliest periods, the child's efforts are engaged in handling the nipple, and then helping him to hold the bottle; later a similar progression is followed for eating solids with spoons. In the same way, the infant's energies are gradually enlisted to cooperate in the control of his postures and movements in dressing and undressing. It is not enough to wait until a baby seems to be ready. Effective caretaking strategies anticipate the development of sensori-motor skills and understandings, through drawing the child's attention to processes in each of the caretaking procedures which, it is

believed, prepare the ground for the smoother and more rapid development of coping.

Key to this process is an extensive use of language in simple, clear form. Baby talk as a blurring of language forms is discouraged, except for a few diminutives to facilitate rapport. Long before speech itself can develop, using language to label and describe objects and events in a caretaking routine is looked upon as a powerful agent for developing the infant's receptive language and cognitive comprehension of the world about him.

The repetitious, somewhat ritualized character of these daily caretaking routines make them ideal situations for acquaintance with a variety of objects - items of cooking, clothing, bathroom fixtures, types of food, eating utensils, furniture, parts of the body, etc. - and simple relations and functions - eating, sitting, on, under, beside, holding, etc. - as a simple basis for understanding the world.

Another of the natural advantages of these routines for learning is how easily they permit coordination of language description with environmental events. Piaget has stressed the importance of sensori-motor operations for the infant level (1952). While I feel it is essential to anchor all stimulation for infants and young children in concrete activity, the early significance of language as a cognitive organizing and abstracting tool can hardly be overemphasized, as Vygotsky (1962), Luria (1961) and many psycholinguists (Chomsky, 1957) have underscored. For this reason the use of language by teachers and students is almost everywhere encouraged. It is interesting, parenthetically, how many young adults become self-conscious, finding it difficult to use language freely with young infants,

apparently because they can give no feedback in verbal form. Only after a period of training and experience with infants, perceiving the richness which rich language eventually develops in our toddlers, do students become convinced of the importance of early, extensive language stimulation.

The Organization of Physical and Social Environments

Both the physical and social environments in the day care center, and to some extent in the home, are the subject of continuing analysis and organization. Our aim is to develop arrangements best suited for the child's productive exploration and enjoyment of activity to facilitate his development. With respect to social environments, the context of a teacher education program supports teacher-child ratios enviable to those of almost any other center. From our experience, I have drafted what appear to be optimal teacher-child ratios relating to the development of autonomy, control, and social and cognitive functions for three different age groups - 0 to 12 13 to 21 and 22 to 30 months - as shown in Table 1. These ratios, I should

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Insert Table 1 about here

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remind you, have been developed in a context of highly enriched care and stimulation, which of course these high ratios are designed to ensure.

But at least as important as the ratios are the attitudes, understandings, and organization of social relations in the center. Actually, our problem is in part that of programming adults in space so they do not intrude too much upon the infants' psychic sphere (some private play is considered

essential for the development of self-propelled personality and cognitive systems), nor interfere with one another by occupying too much of the social and physical space.

For the purposes of their training, students are regularly rotated among the three infant age groups every few weeks and, in addition, spend several weeks of their training year in field work experience in other infant day care and nursery school age centers. This means that the continuity of individual attachment relations between infant and child is maintained more with the permanent teaching staff than with students. From informal observations and incomplete data on measures of social adaptation, however, we seem to find that except during initial periods of adaptation for some infants (usually during the stranger anxiety period from 6 to 12 months or so), it is the quality of relations and the casual play-oriented atmosphere of life in the center which is far more important for the psychic welfare of babies than the fate of specific attachment relations. The large majority of our babies adapt socioemotionally very well within a few days and most of them show a moderate to high responsiveness to the many strangers who visit the center, readily leaving a favorite caretaker in response to physical and verbal overatures by the stranger; they are also generally inquisitive in play and curious to explore unfamiliar physical things and environments (new rooms). Although infants show some preference for adult females over males, the high social adaptiveness of our babies suggests much in favor of the kind of intensive, multiple relations that resemble the "distributive relations" with which Margaret Mead early characterized attachment life in the extended family.

Crawling freely in the halls and spontaneous cuddling are matched with inquiry into processes and problems. Intimacy and play along with learning and cognitive orientations toward activity pervade the atmosphere. Both orientations are reflected in the formal and informal interactions which abound in the flexible set of alternating physical care, free play and guided learning activities followed throughout the day.

Because of the economics of day care, which seldom permits ratios of more than one to four or five between teacher and child in most programs even at the infant level, considerable attention and analysis has been devoted to effective organization of room environments and group processes. A detailed description of these processes and techniques are contained in several guides (Fowler, 1969). These and other processes will be delineated in the discussions to follow on our organization of free play environments and the structure of guided learning situations.

The Design of Play Environments

The physical environment of each playroom (as well as the outdoor playground) is richly equipped with a variety of play materials and equipment. Materials are distributed according to function in areas or zones of activity. Each playroom is divided into several zones partially separated by toy shelves and partitions to facilitate traffic flow, social density, and minimize visual and auditory interferences to concentration and perseverance in play. The zonal divisions are more operative for the two older age groups from 12 months on, as a function of their developing mobility. Specialized toys are rotated at intervals of a few days or weeks for the purposes of maintaining stimulus novelty and to regulate the play and learning options available to develop depth in exploring and mastering the concepts

and operations with toys.

A basic activity repertoire of the several zones consists of a book and story area; a floor play area equipped with unit building blocks, miniature replicas of people, animals and vehicles and other appropriate props; an area for sociodramatic play; a table play area for fine perceptual-motor activity in concept learning, with puzzles, form boards and other sensori-motor and construction toys; a musical area; and an area for plastic art activity. There is also an area for the observation of plants and animals like guinea pigs, gerbils, and so on. Not all of the activity zones are in every room; for example, periods of gross motor activity indoors in bad weather with climbing equipment and wheel toys are usually scheduled in certain playrooms equipped for this purpose.

The value of play is considered to rest upon the opportunities it offers for autonomy in sensori-motor exploration and problem solving. Play is a relatively open-ended activity featuring fantasy and opportunities for the child to discover new relations and master on his own terms half-formed concepts (assimilation in Piaget's scheme of things). There is a broad variety of concepts inherent in the play operations the child can perform with different toys and props to complement the concepts introduced or elaborated through planned programs of guided learning with adults. The generation of self-initiated, self-regulated problem-solving and constructional, integrative and creative operations intrinsic to actions with construction toys, art materials and sociodramatic play are viewed as among the most important functions of the role of play in the child's development.

There is nonetheless a significant though complex role for a teacher in developing play in children. By periodically slipping lightly in and out of a play situation with a child or group of children, a teacher can introduce or reinforce a concept through timely demonstrations combined with brief verbal comments, for example a linear concept by placing blocks in a row, the concept of enclosure by completing a wall, the distinction between a sailboat and a motor boat by drawing attention to salient features, or some rudiments of a social role by recalling the truck driver or carpenter the children have recently seen. She can draw attention to or introduce additional or alternative materials when too many problems arise or interest flags. She can widen horizons and foster collaboration through suggesting alternative social roles and tasks in a group project. Necessarily, at the infant level, most of these activities are quite limited. But the role of the adult in furthering children's motivations and developing complexity and autonomy in their play is significant in proportion to her skill in minimizing her intrusiveness, in her sense of timing, and in her conceptual focus in selecting concepts closely related to the ongoing play. Apart from other sources of developmental progression, the persistence, autonomy, collaborativeness and complexity of children's play is very much a function of a teacher's competence in this subtle sphere.

Developmental Principles for Guided Learning.

The same general principles of emotional sensitivity, warmth, flexibility, and cognitive orientation apply to the structure of guided learning situations as to all other types of activity. The major difference is of course the initiative of the teacher in setting up the activity and the implementation of a teacher plan. Materials and learning tasks are selected, organized,

and sequenced over time, extending through several weeks or months of daily sessions. The scheduling of these activities is interspersed between extensive free play and physical care routines, so that each child typically experiences from 3 or 4 to 6 or 8 or so guided learning sessions, of different degrees of organization, each day. Remember, day care is a very long day, typically from 7:30 or 8:00 to 5:00 or 6:00 in the evening. The children need to experience sufficient diversity and engagement of interest and attention through a well-planned day of activities to sustain their enjoyment and comfort at the center. Systematic planning need not, indeed, should not mean rigid organization and scheduling. Actually, the type of planning required for flexible scheduling of principle-oriented teaching activity, while perhaps more complicated than rote schedules and learning plans, is easily within the developmental competence of high school students, as we have repeatedly found with most of our Mothercraft students.

The principles which govern the organization of a guided learning session center on simplifying the presentation of learning materials and introducing them through play and problem-solving activities to arouse and sustain the child's motivations. Language explanations are used extensively but selectively in direct relation to the manipulation of objects. Teacher interest, attention, judicious praise, and remodeling and re-explaining tasks are encouraged among staff more than verbal correction (negative reinforcement) as a combined means of illuminating relations and motivating children. Guided learning in small groups requires continuing alertness on the part of the teacher and a regularity of shifting attention from child to child to ensure individualization of progression and interest. The advantage of a group is the motivation children develop through

identification and desire to participate with others. There are also possibilities of fostering collaborative efforts through setting up joint tasks as, for example, searching for pieces in the same simple puzzle or form board and interacting in teacher-pupil roles, especially for demonstrations - albeit extremely simple at the toddler level. Props such as blocks, miniature animals, and a variety of containers for developing interesting targeting, insertion, hiding, and other instrumental activities are useful for maintaining and diversifying the form of the play. Learning concepts is thus at times incidental to the major line of the play.

Teaching babies can be difficult because the size of their learning steps, or rules they can learn, is relatively so small to our adult eye, that it is often weeks before substantial changes in object recognition, language, or mastery of a sensori-motor task become visible. The world the infant has to learn is composed of fine-grained patternings of the environment; to the adult, these have long been "perceptual givens" of the world, difficult for him to realize that they were not always integral to his understanding.

But given this apparent lag between input and developmental outcome, how do we design complexity sequences for stimulus presentation and task guidance? For stimulation in physical care, as well as in planned projects, we have little alternative than to rely on our experience with the levels of functioning we observe for babies at different ages, together with the information base provided by developmental norms, test data, and Piaget's observations. The approach is not as crude as it might at first seem,

since the range of skills and understandings which characterize a three month old as compared to an eight month old, or again an eighteen month old, produce strikingly different patterns of behaviors at the respective levels. It is clear, for example, that the eighteen month old can sometimes perceptually survey and attempt to label an array of several objects, while the six month old can rarely attend to more than a single object at a time, perhaps relating it briefly in passing to another object in his immediate field, as well as coordinating it between hand and eye. There are, in other words, general levels of complexity and abstraction, varying in the number and kind of object units, features, functions and relations, to be used as guidelines for teachers in their daily teaching and caretaking roles with babies. There is also the useful, though not always reliable mechanism of feedback, the cue that a teacher uses to tell her how well she is tuned in to an infant's understanding. Useful because it compels the teacher to change her method of presentation or level of complexity in the face of inattention or resistance on the part of the child; but not always reliable since errors of omission can occur through a teacher failing to pace the complexity or novelty of stimulation at the diverse reaches of the child's intellectual schema, as Berlyne (1960), Dember (1965) and Hunt (1969) and the work on preference for stimulus complexity (Thomas, 1965) and novelty (Hutt, 1970) suggest. The child may well adapt but not learn in the differentiated forms and at the optimal pace and range of which he is capable.

Diagnostic Monitoring of Developmental Learning

It should be clear from everything I have said, that the individualization of learning is a primary basis for all of our modes of handling and developing children. The highly favorable teacher-child ratios our teacher education program permits and the techniques we employ are all directed to this end in caring for the infants' needs, in arranging for productive play, and in guiding them in specific learning activities. The advantages I see for small group activity and learning processes in both free play and guided learning are valued precisely because miniature groups foster group processes and identification without sacrificing focus on individual styles and learning processes.

Thus, the supervision and guidance of children in free play, even when concerned with the collaborative activities of a small group in a floor-play building project or in sociodramatic role play, are implemented by tending to the problem of each individual child in turn and the specific dynamics of relationships between children. Similarly, in guided learning projects each program and the specific presentation and interactions of the teacher are addressed to the individual learning problems, style and specific progress of each child in turn. Once again, though interaction between children is often encouraged, the focus is upon the personal understandings and concerns of each child in the dyad.

The development of project learning sequences together with sensitive care and tutoring methods are not sufficient in themselves, however, to take account of even the major aspects that go into an individualized developmental learning approach to children. The infants move across a

variety of situations from day to day and week to week, exposed to multiple caretaking in the day care center and a variety of experiences in the home. Unless there is some concern for tracking and coordinating the myriad of experiences and their combined and cumulative effects upon the child's development, our efforts at best must remain patchy ones. Operating on this assumption, we have been working on a process which I call diagnostic developmental monitoring. The gist of the process is the maintenance of a continuing record of the major events occuring to each child and a running, periodically revised pattern of assessments of each child's developmental progress in critical functions. These assessments are then assembled into a profile of developing competencies with some attempt to integrate them into a picture of how a child functions in some overall or systematic fashion. The changing images of each child are not left to fade in the laboratory, however, but should be used as a feed-back control system for staff (and, where feasible, parents) to design learning activities and to select techniques and styles for tutoring and relating to individual children.

The mechanisms as I have outlined them have not yet been implemented on a comprehensive basis, but will be one of the first priorities of the next stage of my work. In our efforts to date we have sketched a few of the component assessments to be fed into the profile system, such as ratings on behaviors in play and social relations, test score components, particularly where specific ability indices are available, as in the Kohen-Raz Subscales (1967) of the Bayley Mental Scale, language samplings from natural situations and assessments of both socioemotional competence and analytic and integrative cognitive styles.

In preliminary pilot work we have tried out forms for students to use on a daily or, alternately, weekly basis to record three things: the major activities in which the child participates each day, observations on the child's progress, and interest or motivational patterns. The core problem is maintaining a balance between complexity and practicality. It is not easy to design an assessment system which is sufficiently complex to be valid and functional yet simple enough for students and teachers to employ with ease and understanding. Theoretical awareness of the inner complexity of developmental processes is ultimately of little value unless concepts can be distilled to functional terms for teachers to use in the day-to-day decision-making about children's development that everywhere has to be made. Unless the staff and parent who works with the child can understand and perceive the benefits, they will not willingly and reflectively employ the scheme, which then descends into a mockery of empty forms.

Still one of the most functional if imprecise devices for effecting changes in children's development are periodic "case discussions" on individual children, held in conjunction with training sessions on testing or because of staff perception that a child has current problems. Sometimes magical improvements in a child's functioning occur following discussion, which presumably could be traced to enhanced and greater differentiation of teacher perception of the child. The technique has been found useful when extended at random to any of the children in a group, at times multiplying attention for those few less colorful children who are nobody's favorite or nobody's scapegoat. These discussions, the principles for individualizing guidance, and the high familiarity and affection of staff with infants,

constitute an apparently effective, if as yet unsystematically recorded, form of developmental monitoring, which our findings, to which I now turn, are beginning to show.

Preliminary Results and Discussion

Focused Developmental Learning Projects

There are three categories of specific rule learning in which a series of developmental learning projects have been undertaken, namely, common information concepts or object concept learning, language, and instrumental problem-solving. These focused learning projects serve a number of purposes. They provide basic research information; they furnish a research base for generating general curriculum programs, and they supplement our general program of cognitive developmental learning to enrich the infants' experience in specific ways. It is in the nature of a service-oriented day care framework that sampling procedures and controls are necessarily limited. They are determined largely by the small numbers in an age-play group available, where children's needs and playroom organization seldom permit division or exclusion of a membership group into criterion subsamples which would, in any case simply further reduce an already minuscule sample size.

Experimentation has progressed most in the area of object concept learning, for which I shall discuss a project on learning concepts of transportation vehicles. Following this I shall summarize briefly work in the other areas of language and problem-solving.

Object Concept Learning

This is a guided learning project with children ranging in age from 20 to 27.5 months, with a mean of 22.9 months, followed on a near daily basis over a period of 2 to 3 months. The project was carried out in collaboration with a research assistant, Mrs. Sonya Ward and a Mothercraft teacher, Miss Linda McNaughton, initially in a laboratory room, latterly in a regular playroom environment, sometimes outdoors. The aims of the project were to teach both object concept and group or class concept labels of each member of 2 sets of vehicles, namely cars and trucks. Salient features of each vehicle were employed to distinguish each specific object concept (e.g., crane for tow truck and removable top for convertible) and each vehicle as a member of the class car (i.e., carries people) and the class truck (i.e., cab in front and carrier in rear). The chief questions which concerned us were (1) could the children learn two entire sets of object concept labels readily at this age; (2) could they learn to employ the pseudo-class concept labels and object concept labels interchangeably, and (3) could they acquire the rudiments of classificatory concepts as reflected in ability to sort the two sets of vehicles reliably into the correct categories on the basis of verbalized requests using the class concept label.

The learning situation was organized as described above, that is with several toddlers grouped around a table, where they were offered in play miniature replicas (dinky toy types) of cars and trucks, together with a variety of blocks, miniature figures, boxes and so on, as supporting materials for play. The objects were carefully programmed and introduced

only one or two at a time, attempting to ensure mastery of each step along the way before proceeding to each successive step. The general organization of levels of complexity consisted of (1), use of the pseudo-concept label of car and truck with every exemplar; (2), learning the correct object concept label and distinctive features for each of the exemplars of each set in turn (first cars then trucks); (3) comparing cars and trucks according to class labels and distinctive features; (4) repeating focus on object labels; (5) then alternating focus on class and object labels; finally, (6) sorting activities with both sets in combination. Although the sequence was not followed by the teacher quite as faithfully as described here, deviations were not marked and constant review, simplification, and the play orientation seemed to contribute to continuing progress and high interest throughout the project. Incidentally, as might be expected, the content of the project (vehicles) was highly preferred for boys compared to girls.

The results for the project were as follows: typically, at pretesting children could employ the class labels of car and truck appropriately to most (a mean of 10.13 discriminated[2] of the 11 object total) of the members of each set as shown in Table 2. They were unable to sort vehicles into

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Insert Table 2 about here

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groups, however, according to the class labels, and labels for specific

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[2] To simplify reporting, scores for the more difficult recognition process of identification, which run generally lower, will not be generally cited in the text.

vehicles were generally few. The mean for all children for both categories was only 2.01 of the total of 11, with little difference between cars and trucks, or younger and older children.

At posttesting, there were perfect scores for the use of class labels and the total group of children could apply a mean of 8.41 object labels correctly (or 75 per cent) a jump of 6.5. There were greater gains in trucks (4.0) than cars (2.5) and, generally, younger (8.25) than older (5.0) subjects, in both instances because of the lower starting base; but younger children also attained a final level equivalent to that of the older subset (when both Identification and Discrimination scores are considered). With respect to classificatory operations, only one of the eight children could sort all 11 vehicles into two classes without error; but five other infants demonstrated the idea of classification through partial sorting, and all children could respond to and make use of the group or class labels and the object concept labels interchangeably.

Several points can be made in interpreting these findings. It is first perhaps not too surprising that children around 20 to 27 months could learn a set of new labels for objects, some of which were no doubt familiar in this automobile culture of ours. By this age object-word generation should be a well-established rule in the repertoire of manifestly bright and linguistically competent children participating in a highly enriched program of general cognitive stimulation. Mallitskaya (Slobin, 1966, p. 139) succeeded in object-word training with 9 to 18 month old infants, though not without difficulty. Lyamina (Slobin, 1966, p. 138) also found children under 18 months hard to teach but that culturally familiar objects were no

easier to teach than unfamiliar objects. In an early study Strayer (1930) accelerated single word vocabulary development in each member of a pair of identical twins, although the object labels learned may have been highly familiar ones the children were on the verge of learning.

In our study, however, children acquired two labels for the same objects, which they learned to employ interchangeably, along with the beginnings of superordinate relations. Welch (1940) reports a few first order hierarchical concepts in common domains like food and household items present in some bright children, but was unable to impart genus-species concepts to 12 to 20 month old children over a six month period. The slightly older age and favorable general background of stimulation and ability for our infants are probably partly responsible for the progress we may have made. The significance of this progress lies in the fact that it is one thing for a child to acquire concepts through repeated exposure to culturally focused phenomena in daily experience; it is quite another to set up task sequences which will teach selected concepts according to plan.

How great was this progress? At pretesting the children's use of class labels may be termed pseudo-concepts since the labels appeared to operate merely as undifferentiated object labels, often used instead of (but rarely interchangeably with) the more specific object label for a given car or truck. One may question, however, how generalized or stable the object labels, the dual labeling and certainly the developing genus-species relations became at the end of training. No formal transfer measures

were possible at the time. Labeling and sorting miniature replicas, while indicative of a certain form of representational competence, tell us little of competence on a generalized basis in the real world. As evidence we have the occasional reports of children labeling full-scale cars and trucks appropriately, though not of course sorting them into groups.

Is this true classification? Probably not since the mental manipulation of concepts in verbal forms in the face of designed conflict à la Piaget was not even attempted. Yet, clearly, concepts start somewhere; the grasp of the children in holding some part of an idea of abstract grouping operations and inclusion-exclusion seemed evident in their apparent efforts to separate wheat from chaff, hesitating and uneven though they were. Undoubtedly, the focus on criterion features aided the learning and the elaborate play activity interactions, as well as the choice of content, were highly motivating. The play activities and problem-solving operations carried out as adjunctive to the focus of learning also clearly generated a considerable variety of concept learning which would be useful to measure (e.g., spatial relations). The value of the sequential approach and individualization possible in the small group setting is represented in the relative success of every child in the training group, regardless of age and general ability. Incidentally, while the two girls in the project were less interested in this culturally biased boy area, they learned about as well. There is evidence, however, that sequences proceeded too rapidly at certain points in moving from object to interchangeable object-class labeling and sorting, before all of the object labels had

been more thoroughly mastered.

Language Learning

The entire general program is permeated with language to guide and illuminate the infants' activity but there are, in addition, two projects concerned with exploring language learning in more specific ways. One of these is designed to program the operations of language in concept learning in a highly controlled manner through the medium of a language-mediated discrimination learning apparatus. The other is a program for teaching beginning syntactical rules for making language statements by presenting sentences closely coordinated with the physical operations they represent in play with the child.

The discrimination learning apparatus presents a two choice visual stimulus display of miniature animal (or other) replicas, which are attached as handles to doors in a panel. When an infant pulls the correct animal upon a language instruction (e.g., "Pull the cat"), the door opens to reveal a concrete reward (a trinket or bit of cereal). Several sorts of motivational systems are considered to be involved - social support, intrinsic sensorimotor, and extrinsic concrete reinforcement. By varying the form of the language statements and stimulus materials, it is possible to program learning in complexity, for example, in terms of functions or classes (e.g., Pull the animal which gives milk or pull the amphibian). Among other things, the apparatus is designed to compare the efficacy, problems and general developmental effects upon children of controlled versus flexible, play activity forms of learning. Over a series of pilot studies, 10 to 18 month old children have regularly developed correct

object choice behavior to one or two stimuli, on a criterion of 13 of 15 trials, but seldom to alternating stimulus demands. Problems of attentional distraction and motivational drop, have led to the design of a relatively precise and automatic tape programmed prototype model, now under construction. One of our first objectives will be to ascertain what proportion of these attentional problems have been due to the inefficiency of manual control and how much is intrinsic to a paradigm which may be inappropriate to the characteristics of human cognitive processing systems.

The project on language rule learning consists of presenting a sequence of levels of language statements in conjunction with the manipulation of miniature doll figures and other toys in play. The levels consist of object labeling (nouns), action labeling (verbs), combining these descriptions into subject-predicate phrases and later adding qualifiers (adjectives), noun objects and prepositional relations. The method attempts to induce rule understanding by relating language structures closely to the concrete sensorimotor processes to which they apply, and by illustrating operations as general rules by showing the equivalence of forms across specific operations as, for example, in "the boy stands, walks, runs, sits", and so on. In a pilot project, infants in our general program around 16 months of age, a period when readiness to learn subject-predicate phrasing might be expected, were exposed to two to three months of language rule play several times weekly. Two of the children were induced to demonstrate (apparently for the first time) noun phrases while manipulating the toy people and all used both noun and verbal labels appropriately in imitation or autonomously. Further investigation is needed to define and assess the sequences and to determine whether such behavior can be regularly elicited and generalized as generative

rule processes across situations beyond what may be expected through normal development and general stimulation programs like that in our demonstration program.

Problem-solving activities of an instrumental character have been explored in two ways. One student, Mrs. Polly Henniger, developed a series of perceptual variations of task and materials on a drawer opening problem in working with me on her Master's thesis (1968). Six 16 to 20 month old infants (of average IQ, before our demonstration program began) were, after two months of twice-weekly teaching sessions, able to open both criterion and two of three transfer boxes to obtain a lure significantly more often than four controls. Some of the infants displayed signs of cognitive processing in their analytic and integrative manner of orienting to boxes varying in shape, size, materials and position. These infants were also generally more task oriented than oriented to social relations with the teacher.

More recently, I have begun to design a series of instrumental sequences for retrieval and placement of objects. The sequences range from object retrieval by hand in the infant's immediate preceptual-motor field at less than six months to multiple choice among two or more tools and tasks requiring tool assembly to reach objects across barriers, for infants of 18 months or more. These sequences have been tried on a limited basis in the course of regular playroom guided learning sessions, but more carefully designed materials are needed.

A sensorimotor form board apparatus is also under development. The apparatus consists of a set of 48 4" x 4" form boards (in a cabinet),

graded in complexity according to shape, area, number and other concepts. Inserting blocks provided into the form board inserts is intended to induce concept awareness through juxtaposing formboards contiguously in a tray in pairs. Perceptual contrast variables are controlled systematically, one variable or more at a time sequentially to develop concept generalization. Language and cognitive guidance can be varied to study the role of guided versus self-guided and language processes in concept development.

General Program Effects

During the first program year, as shown in Table 3 of Handout, the total sample of advantaged infants made significant mean gains over six months of 11.29 points on the Bayley Mental Scale compared with home reared control nonsignificant gains of 4.5 points. Neither group gained significantly on the Motor Scale. On three applicable Kohen-Raz subscales (Table 4), derived from the Bayley Mental Scale, day care infants advanced generally more than home reared controls but significantly only on Imitation and Comprehension.

The most significant gains during the first year, however (Table 5), are to be found in the high gains of subsamples of younger (N=7; Mean CA=10 months) versus older (N=10; Mean CA=19 months)

infants compared with controls on the two Kohen-Raz scales of Imitation-Comprehension and Vocalization-Social Contact-Active Vocabulary. There were only small, non-significant trends in favor of the younger subsample on the total mental and motor scales.

Long term effects as well as earliness of program participation are beginning to emerge in preliminary data analyses available over two program years on both advantaged and disadvantaged. In Table 6 are shown two advantaged groups (N=6 and 7) who entered the program at a mean age of 21.66 and 11.42 months, respectively, and remained for 10.68 and 17.14 months. The first group made almost no change, moving only from 118.67 to 121.33 points. The second group, who started earlier and remained longer, on the other hand, gained a mean of almost 30 points, advancing significantly from 114 to 143.57 points. It will be noted that the final testing for both groups was on the Stanford Binet. A subsample of 4 advantaged children increased from a mean of 107.5 to 145 or 37.5 points over 17 months, compared to a change for 3 controls from a mean of 96.3 to 113.7 or 17.4 points.

A sample of (N=5) of disadvantaged infants (Table 7) gained significantly a mean of 23.4 points on the Bayley Mental Scale over a mean of nearly 9 months (mean CA=3.9 to 13 months). Three disadvantaged infants gained a mean of 32 points over 15 months. Bayley Motor Scale changes were generally around average levels and increased no more than 10 points in any group.

At the end of the first program year advantaged children displayed generally high levels of socioemotional functioning on the Schaefer and Aaronson behavior inventory (Unpublished). Mean scores at the end of the year on positively valued scales, such as inquisitiveness, positive social response, perseverance and enthusiasm, were almost invariably high (from 14 to 16), while negatively valued dimensions, like negative affect, self-consciousness, passivity and hyperactivity, were generally much lower (from 10 to 12). On three personal-cognitive scales (autonomy, tension level and problem orientation), mean gains over the year were positive but not significant. At the end of the second year, both advantaged and disadvantaged infants display generally good social adaptation to strangers, to unfamiliar environments and in the quality of attachment relations to highly familiar caretakers.

On the basis of initial observations, student and parent development are also generally positive. During the first program year, the first groups of students gained significantly in Hunt's (1967) measure of general concept level, a measure which he reports to be associated with teaching competence. On this measure, development generally proceeds from the concrete to the abstract, the specific to the general, and from egocentrism to relativism, based on student paragraph completions about social rules.

Parents were found to score generally high, and several items, e.g., positive attitude to child interest in child's education,

correlated with gain scores on the Kohen-Raz Scales of Imitation and Comprehension and Vocalization-Social Contact-Active Vocabulary -- though none with the total Bayley Mental Scale.

5. Discussion

There are several implications to the consistently high, if not always so dramatic advances in cognitive development continuing to emerge in association with this comprehensive program of infant care and education. The first is the apparent value of a general, pervasive approach to stimulation for cognitive development, similar to a trend recently reported by Starr (1970) in several infant education projects. Although, methods are specific, they assume the form of play -- and interpersonally-oriented language linked, cognitive learning principles developed for all major domains of infant experience in day care and the home. Involvement, enthusiasm and coordination of parent care and teaching activities has been one of the most successful aspects of the investigation. The importance of emotionally warm and sensitive relations with the babies in all relations and teaching situations, formal and informal, is also considered to be germane to much of the cognitive facilitation and show up specifically in the interpersonal ratings of socioemotional responsiveness, adaptiveness to new situations and strangers, inquisitiveness and perseverence in play and problem solving. Seemingly, consideration of the child as a unitary, affecto-cognitive system is a useful frame of reference for designing optimal developmental care and learning programs. The latter consid-

cration also finds support in the cumulative developmental learning effects evident in the data so far in the apparent advantages accruing from earliness of exposure and duration of participation in the program. On the other hand, some differentiation in types of functioning is to be noted in the relatively lesser gains of children in motor (both gross and fine) development compared to most other areas, especially, language, general cognition and social competence.

Additionally, the marked and general advances in competence and sensitivity to infant care and education of high school students through a one year program of coordinated, theory-based and practical training augurs well for the establishment of large scale teacher education programs to meet the accelerating demand for infant care. Finally, the magnitude of many of the gains on both advantaged and disadvantaged children -- assuming continuing confirmation on larger samples over longer spans of development -- suggest a greater range of cognitive and sociocmotional potential than generally realized in many cultures.

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Just completed partial analysis of progres
of larger samples of advantaged children
accumulated so far (Table 8) shows much th
same pattern of mean gains favoring earlin
of entry into and length of time in progra
Further data on disadvantaged children is
not yet available.

A Developmental Learning Approach to Infant Care in a Group Setting

by

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Tables for paper presented at the Merrill-Palmer Institute
Conference on Research and Teaching of Infant Development,
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Table 1

Developmental Age Groups and Teacher-Child Ratios

Developmental Age Groups	Approximate Age Range (Months)	Predominant Developmental Characteristics: Physical Mobility	Infant's Participation in Physical Care	Scheduling	Language	Sensori-Motor Play	Socioemtional Relations: Adults	Peers	"On the Floor" Teacher-Child Ratios
Younger Infants	0 - 12	Minimal: None to crawling	Minimal development of interest in comfort and attention to routines	Highly individualized and flexible. High ratio of sleep, eating and routines to waking and play	Comprehension; babbling but no speech	Highly circumscribed and focused in direction, distance, number of objects and relations. Interest in objects as ends in themselves rather than tools for a purpose (except hands as instruments)	Close and relative dependency on and interaction with one adult at a time	Responds to single infants for brief periods but largely through contiguity alone	1:2

Younger Toddlers	13 - 21	Moderate Walking to beginning running	Beginning participation in single acts and attention to details of eating, dressing, toileting, etc.	Moderate stabilization in routines; long periods of play and wakefulness	Single words and holophrases; extended comprehension	Extension of area of focus beyond immediate environment; relating two (or more objects)--objects as instruments to other purpose. (e.g.,simple puzzles, form boards)	Relative autonomy in a familiar and friendly environment. Some adaptation to care and (individualized) guided learning in groups of 2 to 4 children but limited peer interaction	Some initiating of contact but interaction limited in quality and duration.	1:3

Older Toddlers	22 - 30+	Mastery: Walking, running, stair climbing, beginning wheel toys	Relative autonomy in certain routines--eating, toileting, stair climbing, getting into cot, etc.; some participation in all others--e.g. dressing.	Good adaptation to flexible routines of a group. Typically one nap per day.	Syntax and more elaborate comprehension	Interest in multiple patterns, objects and relation sustaining (brief) chains of means-end activities.	Multiple adaptation, some cooperative interaction and considerable autonomy in relations in (small) groups of all types and of both adults and peers.	Initiates and interacts socially with others functionally with some persistence	1:4

Table 2

Mean Scores of Training Group in Identifying[a] and Discriminating[b] Objects by Object and Class Labels at Pre- and Posttesting

	Age Group[c]	Concept Categories											
		Cars (N = 5)				Trucks (N = 6)				Combined (N = 11)			
		Object Label		Class Label		Object Label		Class Label		Object Label		Class Label	
		I	D	I	D	I	D	I	D	I	D	I	D
Pretest	Younger	.50	.50	3.75	5.0	0.0	0.0	2.75	4.5	.50	.50	6.50	9.50
	Older	1.25	1.50	4.75	5.0	1.50	1.75	5.75	5.75	2.75	3.25	10.50	10.75
	Total	.88	1.13	4.25	5.0	.75	.88	4.25	5.13	1.63	2.01	8.50	10.13
Posttest	Younger	2.0	3.75	5.0	5.0	2.0	5.0	6.0	6.0	4.0	8.75	11.0	11.0
	Older	3.0	3.50	5.0	5.0	3.0	4.75	6.0	6.0	6.0	8.25	11.0	11.0
	Total	2.50	3.63	5.0	5.0	2.50	4.88	6.0	6.0	5.0	8.41	11.0	11.0
Change	Younger	1.50	3.25	1.25	0.0	2.0	5.0	3.25	1.50	3.50	8.25	4.50	1.50
	Older	1.75	2.0	.25	0.0	1.50	3.0	.25	.25	3.25	5.0	.50	.25
	Total	1.62	2.50	.75	0.0	1.75	4.0	1.75	.87	3.37	6.50	2.50	.87

[a] Identification of objects without verbal cue in answer to question "What is this?"

[b] Discrimination of objects with verbal cue in answer to guestion "Where is the ___?"

[c] Mean ages of Younger (N = 4) and Older (N = 4) groups were 21.6 and 26.8 months, respectively. Mean IQs were 127.25 and 139, of which some were Bayley and some were Binet tests.

Table 3

Comparison of Mean Change Scores on Bayley Mental and Motor Scales For Day Care Infants and Home Reared Controls: First Program Year

Period	Age in Months		Mental Scale (MDI)		Motor Scale (PDI)	
	Mean	Range	Day Care (N = 17)	Home Reared (N = 18)	Day Care (N = 18)	Home Reared (N = 16)
Time 1	15	4-24	111.47	103.22	98.61	104.19
Time 2	21	10-30	122.76	107.72	102.56	110.06
Change	6		11.29	4.50	3.95	5.87
t			2.22*	1.14	1.28	1.33

*p <.05 (two tailed)

Table 4

Comparison of Mean Change Scores (Age Placement) between Day Care and Home Reared Infants[a] on Three Kohen-Raz Subscales of Bayley Mental Scale: First Program Year

Period	Eye-Hand Scale 1			Imitation and Comprehension Scale 4			Vocalization-Social Contact-Active Vocabulary Scale 5		
	Day Care	Home Reared	Difference	Day Care	Home Reared	Difference	Day Care	Home Reared	Difference
Time 1	13.84	13.85		15.22	15.47		15.42	14.90	
Time 2	18.74	17.98		20.63	18.56		20.18	18.02	
Change	4.90	4.13	.77	6.02	3.61	2.41*	5.21	3.71	1.50

*$p < .05$ Wilcoxon (two tailed), but not t.

[a] N = 18 for each group at both testings except for Time 2 and change scores for Scales 4 and 5 for both groups.

Table 5

Comparison of Mean Change Scores (Age Placement) for Older and Younger Subsamples of Day Care and Home Reared Infants on Three Kohen-Raz Subscales of Bayley Mental Scale: First Program Year

Subsample	Eye-Hand Scale 1			Imitation and Comprehension Scale 4			Vocalization-Social Contact-Active Vocabulary Scale 5		
	Day Care	Home Reared	Difference	Day Care	Home Reared	Difference	Day Care	Home Reared	Difference
Older ≥15 months (N = 11)	4.77	3.63	1.14	4.75	4.18	.57	2.97	2.95	.02
Younger ≤14 months (N = 7)[a]	5.09	4.91	.18	8.35	2.55	5.80**	9.32	5.10	4.22*

*$p < .05$; **$p < .01$ (two tailed)

[a]N = 6 for Time 1 and Difference scores for Scales 4 and 5 for both Day Care and Home Reared Younger subsamples.

Table 6

Comparison of Mental Test Scores of Two Groups of Infants Varying in Age and Duration of Participation in a Demonstration Program

	Infants		Time 1 Bayley Mental Scale (MDI)	Time 2 Binet (IQ)	$T_1 - T_2$	$T_2 - T_3$	$T_1 - T_3$
	A			111	114	+3	
	B			151	137	-14	
	C		a	113	122	+ 9	
	D			100	115	+15	
	E			100	128	+28	
Group	F			137	112	-25	
A		$\bar{X}$		118.67	121.33	2.67	
		t				.3370	
(N=6)		df				5	
	$\bar{X}$ CA			21.66	29.33		
	$\bar{X}$ Mos. in Program			2.0	10.08		
	X Mos. in Day Care			15.08	23.33		
	T		107	127	143	+20	+16	+36
	U		124	121	146	- 3	+25	+22
	V		81	138	140	+57	+ 2	+59
	W		117	132	152	+15	+20	+35
	X		113	118	125	+ 5	+ 7	+12
	Y		136	125	129	-11	+ 4	- 7
Group	Z		120	134	170	+14	+36	+50
B		$\bar{X}$	114.0	127.87	143.57	13.86	15.71	29.57
		t				1.6731	3.3622***	3.4657***
(N=7)		df				6	6	6
$\bar{X}$ CA			11.42	17.57	26.71			
$\bar{X}$ Mos. in Day Care			7.07	13.29	22.36			
X Mos. in Program			2.0	8.21	17.14			
Differences								
$\bar{X}$				9.20	22.24			
t				1.1001	3.1101***	1.4713		
df				11	11	11		

a group A entered Mothercraft before program began, so not measured at this age.

* $p \leq .05$, 1 tail

** $p \leq .025$, 1 tail

*** $p \leq .01$, 1 tail

Table 7

Change in Bayley Mental Scale Scores (MDI) from Time 1 to Time 2 for a Sample of Disadvantaged Infants Participating in Demonstration Program for a Mean of 9 Months

N = 5

Infants	Bayley Mental Scale MDI Time 1	Time 2	Change
N	118	136	18
O	80	126	46
P	78	105	27
Q	96	98	2
R	88	112	24
$\bar{X}$	92.0	115.4	23.4
t			3.2909**
df			4
Mean CA	3.9	13.0	
$\bar{X}$ Mos. in Day Care	1.2	8.8	
$\bar{X}$ Mos. in Program	1.2	8.8	
$\bar{X}$ Mos. in Program minus absences	-	7-8	

** $p < .025$, 1 tail

Just completed partial analysis of progress of larger samples of advantaged children accumulated so far (Table 8) shows much the same pattern of mean gains favoring earliness of entry into and length of time in program. Further data on disadvantaged children is not yet available.

Table 8

Mean Mental Test and Change Scores on Cumulative Samples of Advantaged Infants Grouped According to Time in and Age of Entry into Program

Age[a] of Entry into Program	Length on Time in Program (Months)							
	≤6		6 - 9		9 - 14		>14	
	Younger (N = 22)	Older (N = 7)	Younger (N = 17)	Older (N = 7)	Younger (N = 6)	Older (N = 5)	Younger (N = 9)	b
Initial Test	111.4	113.1	111.6	113.1	111.5	115.0	114.4	
Final Test[c] for Period	122.3	118.7	122.8	118.9	140.3	123.2	137.4	
Change	10.9	5.6	11.2	5.8	28.8	8.2	23.0	
t	2.61**	.971	2.18*	1.006	2.90*	2.79*	2.62*	

* $p<.05$; ** $p<.02$ (two-tailed tests)

[a] Younger = 2 to 13 months; Older = 17 to 23 months

[b] Older group "graduated" by end of prior period

[c] Test comparisons for 6 and 6-9 months periods were Bayley Mental and Binet Scales for Initial and Final Tests, respectively; for 9-14 and >14 months periods the Binet Scale was used for Final testing due to ceiling effects on the Bayley (the larger N = 9 for the Younger sample at >14 months, compared with N = 6 for Younger group at 9-14 months period is because 3 children were demonstrating ceiling effects on the Bayley at the latter period yet were too young for a Binet).